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ABSTRACT

Designed to assist educational researchers in utilizing microcomputers, this paper presents information on four types of computer software: writing tools for educators, statistical software designed to perform analyses of small and moderately large data sets, project management tools, and general education/research oriented information services and specific databases. For each category, recommendations and explanations for use are given for some specific software packages. For word processing, nine possible program characteristics are also listed to aid in comparison shopping. In addition, special enhancement programs for proof reading assistance, punctuation and style aids, and thesaurus help are given. Information on statistical analysis and project management software includes program title, publisher, and a brief explanation of its use. Two professionally oriented databases--DIALOG and Bibliographic Retrieval Services (BRS)--are described together with their special services for personal computer users. The services of three popular personal databases--COMPUSERVE, DOW JONES NEWS/RETRIEVAL and the SOURCE--are also described, as well as a microcomputer software search assistance system--InSearch. A list of 13 databases useful to educators and trainers is provided which includes explanations of equipment and telephone network requirements for accessing them. (JB)

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MICROCOMPUTERS & EDUCATIONAL RESEARCHERS:

WRITING, PROJECT MANAGEMENT, STATISTICS SOFTWARE, & DATA RETRIEVAL

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March 1985

INTRODUCTION

This paper provides information on the availability, usefulness, and procedures for using microcomputers in educational settings. This will be done by examining: 1) writing tools for educators, 2) statistical software designed to help solve educational questions, 3) project management tools, and 4) general education/research oriented information services & specific databases. The procedures for using these microcomputer based software programs will also be explored.

Writing tools such as word processors and related programs as spelling checkers, electronic thesaurus, word grade level/difficulty checkers, and punctuation and style checkers increase the quality of our work by catching our errors and suggesting better alternatives. There are many of these software programs not yet understood and used by many professionals.

Until recently it was impossible to use personal computers to assist in processing data for statistical analysis. When 16 bit microcomputers became available, the capabilities of mainframe computers became available on these smaller devices. A list of statistical programs will be examined.

Working educational researchers require immediate access to relevant information involving their current interests. The computer center manager will often provide these user services directly through the computer center. In the past few years dramatic progress has occurred in providing on-line information storage and retrieval service. Information can now be stored in a more compact and less expensive manner and it is now possible to retrieve more relevant and current abstracts and documents.

The information networks include DIALOG, BIBLIOGRAPHIC RESEARCH SERVICE, THE SOURCE, and COMPUSERVE. The databases they include were often taken from print-based third-party equivalents; Environmental Health and Pollution Control, Environmental Period Bibliography, Environmental Abstracts, Index to Health and Safety Education, Index to Environmental Studies, Chemical Abstracts, Congressional Record, Psychological Abstracts, Academic American Encyclopedia, Book Review Index, Career Placement Registry, Dissertation Abstracts, Educational Resources Information Center, Foundation Directory, Dow-Jones, and so on. The information in these electronic "libraries" is current; usually up-dated on a weekly or monthly basis and often is less costly per use than the paper alternative. These databases are instantly and conveniently

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available from our office desks using a microcomputer or terminal, modem and appropriate software.

WORD PROCESSING FOR THE EDUCATIONAL RESEARCHER

The researcher/computer user are concerned with writing proposals, reports and instructional materials involving ideas which are communicated by words. Efficient word processing then is a primary reason for us to consider using microcomputers.

Microcomputers can provide us with "smart typewriters." These typewriters can permit easy input of alpha/numeric characters, automatic correct via spelling checkers (or thesaurus or punctuation or style) programs. Entire blocks of information can be moved or copied within or between files. Automatic substitution of one word or phrase for another is possible as the writer changes his focus or intention. Writing papers, articles, books or whatever is simplified with word processing programs such as WordStar (Micro Pro International, PFS:Word, VisiWord, EasyWriter II (Information Unlimited Software), Spellbinder (Lexisoft), The Final Word, Volkswriter, Applewriter. Typically, as the program becomes more powerful it becomes more complicated.

If your major use for a microcomputer is to be word processing, invest in the best. Look at the alternatives and choose the one which has the features you want. Use this list for comparison shopping:

- hyphenation
- scroll functions (vertical/horizontal)
- jump (to beginning, preset markers, next page, new screen, next word, next paragraph, end)
- block (merge, move, copy)
- insert (character, line, word)
- word wrap (automatic)
- delete (character, word, line, rest of line, block)
- screen and/or print formatting (margins, tabs, underlining, bold type, centering, page width/length, split screens, search and replace, command/status line)
- printer options (continuous forms, multiple copies, simultaneous I/O spool, changer pitch, change fonts, stop/pause, proportional spacing, right/left justification, headers, footers, super/subscripts, double-column printing [script writing, articles])

The choice of a wordprocessor may help you decide which DOS to use (the one used by the word processing package) and perhaps which microcomputer (the one which runs the DOS for your word processor).

Proof Reading Assistance

Proof reading a document developed by a word processor is fairly simple, convenient, and will greatly improve the quality of your writing. Assistance comes in several forms: spelling checkers, readability analysis, punctuation and style analysis, thesaurus help, and automatic style help (indexing, footnoting,

table of contents generation). Quality is an elusive parameter but is concerned with tailoring the message to fit the user's vocabulary level, information retrieval patterns and expectations.

Spelling checkers should be chosen to work with your word processing package. The WORD Plus 2.0 (Oasis Systems, $150) operates with CP/M or MS/DOS systems and is preset for WordStar but can be reconfigured for many other word processing packages. It has a 45,000 word dictionary and can be expanded by the user to reflect their unique areas of interest. The Word Plus will suggest correct spellings, allow you to see misspelled words (words which are not in its dictionary) in context, but will not correct hyphenation errors. Perfect Speller (Perfect Software) has a 50,000 word dictionary but does not correct errors in context nor catch errors in hyphenation. Spell 1.5 by Software Toolworks very similar to Perfect Speller.

Spell Star (Micro Pro Int'l) is a CP/M or MS/DOS-based speller designed to be used with WordStar and has a 20,000 word dictionary. MicroPro released in 1984 a new, and greatly improved, spelling checker called CorrectStar (same as Spelling Corrector by Houghton Mifflin). CorrectStar is designed for WordStar version 3.3 (IBM-PC) and has a 65,000 word dictionary (9,000 words or about 89 percent of the most frequently used words are loaded into RAM for speedy operation). This is a very good program which will correct your document after allowing you to view alternative spelling based on a phonetic search algorithm. There are at least a dozen spelling checker programs available. The Random House Proofreader (Aspen Software) is another good spelling program with up to a 50,000 word dictionary which can be expanded to 80,000 words. EasySpeller (Information Unlimited Software) was designed to work with EasyWriter II and uses the same IBM function keys as EasyWriter. Still another good package is Spellguard (Sorcim) with a 20,000 word expandable dictionary.

Punctuation and Style Aids like Punctuation + Style (Oasis Systems, $125) are **"writers helpers"** which allow a user to improve their writing and to catch errors in word processed files. It will improve a file by identifying incorrect, extra or missing punctuation, missing or extra spaces, incorrect abbreviations, missing capitalization, unbalanced quotes or parenthesis in a paragraph, repeated words and incorrect forms for numbers. It will look for, and suggest changes for, words or phrases which are commonly misused, perhaps sexist (busboy>clearer), and mark them so they may be changed. Awkward phrases and too many and/or unnecessary modifiers will be identified. The program works well but is slow--to be effective the user must mark the places with the errors and insert the notes relevant to the suggestions. The checker is especially helpful in polishing a short document or letter. Another "writers helper" is Grammatik (Wang Electronic Publishing, $75). This program also checks text files for style, wordiness, cliche phrases and other writing flaws. Electric Webster 1.8 (Cornucopia Software, $209.95) is a spelling checker and a punctuation and style checker).

A readability analysis of the developed materials will suggest if the difficulty level is appropriate for the intended audience. The most useful readability formula is probably the Flesch reading index. There are also the British Reading Age Index, the Fog Index and the Cloud Index. These checkers frequently will do a word frequency analysis of the document to determine which words are most used (perhaps over-used). RightWriter 1.1 (Decisionware Inc., 4030 Gulf of Mexico Drive, Longboat Key, FL 33548, 813/383-6059, $75) uses a readability index (based on the Flesch-Kincaid formula--the government's standard), provides a word count, a strength index (based on number of qualifiers, modifiers and passive verbs), descriptive index (measures the number of adjectives and adverbs; documents with an index greater than 1.0 have more modifiers than verbs and tend to be confusing), jargon index (words known only to insiders, with with -bility, -wise, -lity and nouns improperly turned into verbs by adding "ed", "ing" or "s." The purpose of this type of program is to help individuals improve their own writing skills, edit documents, help faculty members who want "automatic" assistance with grading and giving student's feedback on their writing; providing the students provide their homework on a IBM-PC or compatible disk. The Author's Analyst (MDS Software Assoc., 11803 Bretton Court, #32B Reston, VA 22091, 703/860-9537, $35) also has a readability index and flags trite phrases. Note that Punctuation+Style, ReadiWriter & Author's Analyst will work directly on WordStar 3.3 (not WS2000), Volkswriter Delux, PC-Write, EDLIN and other word processors that turn out standard ASCII text files. They will usually work with Microsoft Word, MultiMate & Samna IiI which can be translated to a print image or ASCII file.

Programs, such as DocuMate/Plus (Orthocode), can generate a table of contents or construct an index (by processing "marked" words to be included in the index) or place footnotes at the bottom of a page. In some cases it may be easier to do these things in the old fashioned manner, but these programs can reduce the time required to accomplish writing or editing tasks.

To personalize form letters, you can easily merge individual names, addresses and other blocks of information into the basic letter. MailMerge was designed to work with WordStar and inserts the information to any designated place in the letter.

A thesaurus can be easily used by word processing users to find the better word you are searching for. The Random House Electronic Thesaurus (Wang) comes with 60,000 synonyms for the 5,000 most used and overused English words. This program will allow you to put the cursor under the word you wish to check, hit the <ESC> key and a list of alternatives will be displayed at the top of the screen. It can then automatically insert the selected alternative.

By using a good word processing system, a good spelling checker, a punctuation and style checker and an on-line thesaurus a writer can dramatically improve their ability to express themselves

(perhaps make the difference in getting articles or proposals accepted).

STATISTICAL ANALYSIS SOFTWARE

"For both small data sets (e.g., fewer than 100 cases and 30 variables) and moderate ones (e.g., fewer than 2000 cases and 250 variables), it is not only possible to perform analyses on a microcomputer rather than a mainframe, it may even be the more desirable alternative. For example, in a professional research environment, the cost savings from using a microcomputer may pay for both the hardware and software in a relatively short time. Furthermore, day-to-day users may prefer the interactive features common in microcomputer packages to the batch-mode operation of most popular mainframe packages." (Carpenter, J. [1984, April]. Statistical software for microcomputers, BYTE, 234-264)

Some of the better statistical programs are:

SPSS/PC-XT (SPSS Inc., 444 N. Michigan, Chicago, IL 60611, 312/329-2400). Powerful programs for 16-bit computers (DEC 350/PRO; VAX; IBM-PC [XT only], $795). Menu driven program offers transformation, selection and reporting facilities for data analysis. SPSS/PC has most of the power and ease-of-use of the Mainframe package. It adds the fixed cost and privacy of a personal computer. It is sufficient for all but the largest statistical tasks.

StatPro (Wadsworth Professional Software, Statler Office Bldg., Suite 1435, 20 Park Plaza, Boston, MA 02116, 617/423-0420, $795). Menu driven and very easy to use. Data entry is easy. Statistics can be graphed for exploration or reporting purposes.

STAN (David M. Allen, Statistical Consultants, Inc., Park Plaza Office Bldg., 462 E. High St., Lexington, KY 40508, 606/252-3890). An exceptional package for performing the analysis of linear models such as multiple regressions. Regression (simple, multiple), ANOVA (contrasts), Durbin-Watson Diagnostics. Does not seem as powerful as SYSTAT, but is probably easier to use. Good documentation, fair data management, fair data processing, fair summary statistics, fair graphics, good linear models, fair time series, no nonparametrics & tables. Operates under Apple or IBM Pascal DOS, Object Code, Uses menus and questions, has helps, poor error handling, handles max of 31 variables, handles real and character variables (not integer), 64 K RAM reqd, 2 disk drives, $300 with graphics, $250 w/o graphics.

Statpac (Wallonick Associates, 5624 Girard Ave. South, Minneapolis, MN 55419, 612/866-9022, IBM-PC/XT and KayPro). $400 (Preview copy w/ ten variables, $50) Unlike stat programs, this one runs in batch mode. It can read any ASCII file created by another program or downloaded from a mainframe. It can handle 5000 cases with up to 255 characters of information per case. Statistic selections and printing options (including graphics) available on all analyses. Includes chi-square, correlation & linear regression, t-

tests, one & two way anova, multiple regression, etc.

SYSTAT (Systat Inc., 1127 Asbury Ave., Evanston, IL 60202, 312/864-5670). A very good package for performing analysis of linear models. Perrorms Spearman Rank-Order Cor., Goodness of Fit, Log-Linear Models, Regression (simple, multiple, polynomial, stepwise), T-test (paired groups), ANOVA (30 N-way, contrasts, Unequal cell sizes, random effects, Factor Analysis, gen Lin models, Durbin-Watson Diagnostics). Good documentation, good data management, good data processing, good summary statistics, fair graphics, good nonparametrics & tables, good linear models, fair time series. Fast operation. Operates under CP/M-80 (56K RAM), PC-DOS (256K RAM), Unix (500K RAM), Object code, commands (limited and simple) instead of menus or questions, Good error handling, 75 variables w/ IBM, real and character variables (not integer), $495. Seems to be the program to BUY.

The Statistics Series, Human Systems Dynamics, 9010 Reseda, Suite 222, Northridge, CA 91324. A series of packages (AnovaII, $150; HSD Stats, $50; RegressII, $150; Stats Plus, $200). For Apple Computers.

PROJECT MANAGEMENT SOFTWARE

Programs to assist a manager in project scheduling and cost estimating, budgeting, critical path analysis, and personnel control are available. Management packages serve diverse needs. VisiSchedule assists in showing the trade-offs among cost, time and personnel factors by leading you through the steps of defining the project and then doing the calculations. Project Scheduler has GANTT charts and critical path capability. QBD will assist in sales forecasts, multiple linear regression, rank correlations, PERT/CPM, decision tree (lease/buy) development, etc.

If the management process could be put into a formula and represented in schematic form it might look like this:

Conception of Idea	->Recording of Idea	->Refinement of Idea	->Transformation of Idea into Plan	->Inception of Plan	->Managing Plan's Progress

The computer can also be used to help a manager arrange and refine random thoughts or ideas into a plan. One of the most useful ways to record & arrange ideas so they can be manipulated is through an outline. They usually include an outline generator and a simple word processor. Ideas can be entered randomly and later organized into categories and subcategories in word, phrase, sentence or paragraph form. Think Tank and Thought Organizer/Thor are two such "creativity" programs. More on these programs later.

Management Planning and Scheduling Programs

Management planning consists of several elements, some of which are amenable to automation: creating the detailed work break-

down, determining available resources, estimating amounts of resources, calculating budgets, scheduling activities and/or resources, making trade-offs between scope, budgets and schedules and finally, estimating total project budgets and schedules.

These packages may either be oriented to allocating resources of one or more projects or may be relatively more focused on the project activities. The packages oriented to allocating resources tend to 1) calculate resource units, 2) calculate dollar values of resource units or activities, 3) calculate schedules of resources or activities, 4) calculating resource-unit estimates based on models or parameters, 5) planning system resource or activities over time, 6) monitoring system progress of resources or activities, 7) permits system formatting of own reports, and 8) the system serves as a work-bench for communications w/ other project team members. Few packages work well in all areas. The second grouping, activity-oriented systems, include packages which estimate cost, schedule and/or monitor events as opposed to resources.

Activity-oriented systems calculates resource units including 1) dollar values of resource units and/or activities and/or 2) calculated schedules (time) of resources and/or activities. The capability range is as 4 to 8 above.

Note: Assume minimum requirements of an IBM-PC/XT with at least 256K RAM unless otherwise specified.

Aepex, Timberline Systems, 7180 S. W. Fir Loop, Portland, OR 97223, Estimate cost, time and allows monitoring progress of resources or activities and permits user to format own report.

Epsilon, Cara Corp., 611 E. Butterfield, Lombard, IL 60148. Estimate cost, time and allows monitoring progress of resources or activities and calculates resource-unit estimates based on models or parameters.

Estiplan, AGS Management Sys., 880 First Ave., King of Prussia, PA 19406. Estimate cost, time and allows monitoring progress of resources or activities and calculates resource-unit estimates based on models or parameters.

MicroGANTT, Earth Data Corp., POB 13168, Richmond, VA 23225, 804/231-0300, PC/XT or CP/M (8/16 bit), ANSI Standard Color (MS-DOS), $395 (Demo $25). Estimate cost, time and allows monitoring progress of resources or activities and calculates resource-unit estimates based on models or parameters, and may format own reports. Menu driven. Critical path (not symbols), slack time, time billing per time unit per task.

Organization Map, Jr., Pacesetter Software, P.O.Box 5270, Dept. W., Princeton, NJ 08540, 609/737-8351, $895, menu driven, (demo $85 - only tracks seven people). A human resource, decision-support package and organization analysis and productivity-improvement support system. Track company management levels, assigned project and project costs.

Plan Trac, Computerline, Ltd., 755 Southern Artery, Qunicy, MA 02169. Plans resource or activities or time, etc.

Project Manager WorkBench, Applied Business Technology Corp., 76 Laight St., New York, NY 10013. Lots of capability!

Schedule-IT: Project and Task Scheduling, 16 Academy Street, Skaneateles, NY 13152. Consists of 3 packages Undercontrol, $125, Gantt-It, $70, and Schedule-It, $90 or $285 for entire package which will do Critical Path, Slack Time, What-If scheduling, milestones.

VisiSchedule, VisiCorp, 2895 Zanker Road, San Jose, CA 95134. Assists in showing the trade-offs among cost, time and personnel factors by leading you through the steps of defining the project and then doing the calculations. Somewhat limited capabilities relative to other schedulers.

QBD (Stuart Software, CP/M program,) For sales forecasts, multiple linear regression, rank correlations, PERT/CPM (will not print out network), decision tree (lease/buy), etc.

Demi-Plan: Project Management System, 62 Nursery Road, Ridgefield, CT 06877, 203/431-0864, $40.95. Format I2 is for PC/XT. Prints Gantt charts, resource histograms, task/resource reports. Determines the critical path of a project and allows project manager to do "what if" to determine effect of date or resource changes on a project's completion date. To 100 tasks (each task can have 20 dependent tasks.

Harvard Project Manager, Harvard Software, 521 Great Road, Littleton, MA 01460. Provides time, not cost calculations based on models or parameters and plans resource activities over time.

SuperProject, Sorcim/IUS Micro Software, 2195 Fortune Drive, San Jose, CA 95131, 408/942-1727. A powerful yet easy to use menu-driven package which provides both PERT/CPM and Gantt charts.

Milestone, Digital Marketing, 2363 Boulevard Circle, Walnut Creek, CA 94595, 415/947-1000, $250 ($30 demo). Two floppy or hard disk drive plus an impact or graphic printer. Do milestones, "what-if" analysis to examine trade-off between manpower, dollars and time, cost projections, etc.

Primavera Project Planner, Primavera Systems, Inc., 29 Bala Ave., # 224, Bala Cynwyd, PA 19004, 215/667-8600, $2500. Handles up to 10,000 activities, use precedence (activity on node) to show relationships, up to 128 successors for each activity, resource availability drives activity schedule, calendar, bar charts, reports, ID overworked resources, updates activity/resource database and actual costs, cumulative costs on histogram, graphic and tabular cost reports. This is a batch program so you will not see an updated time line as you can with MicroGANTT. Also has Primavision Plotter Graphics ($1500) for use with HP or Houston Instru-

ment plotters to provide graphic displays.

Project Scheduler 5000, Scitor Corp., Bldg 7, 256 Gibralter Dr., Sunnyvale, CA 94089, 408/730-0400. Has GANTT charts and critical path capability.

TaskManager, Quala, 23026 Frisca Drive, Velencia, CA 91355, 805/255-2922, $395. To manage people, jobs, coordinate due dates and juggle workloads. Handles to 999 tasks, tracks this data for each task: task number, description of task, priority of task, beginning date, completion date, department assigned, person responsible, project ID, sub-project ID, man-hours, percent complete. Gives reports: gantt chart, task listing, man-hour summary report.

Personal Time/Activity Management

In order to better control individual time desk organizers and time scheduler/Organizers are available. Many of these packages will operate "on top" of another applications program. For example, if you were writing an article using WordStar and the telephone rang, you could pull Spotlight or SideKick or other productivity or time management package into use without leaving your WordStar file. You could get you calendar to determine if you could schedule an appointment, call up the notepad to make a not to yourself about the telephone call, pull down a calculator to do some math, check your telephone list to provide a needed number, etc. The Desk Organizer (Warner Software, $195), Side-Kick (Borland International, $49), and Spotlight (Software Arts Inc., $150) are also useful in organizing oneself. Time Scheduler/Organizer (Softrend, $99) is used for appointment scheduling, project management, maintenance schedules, legal deadlines, investment reminders, etc.

Creativity Software

To facilitate the organization of ideas, in a manner taught by most English teachers as the correct way to outline an essay, an outline complete with major headings and subheads is available. These "idea processors" or "outline processors" can be modified or expanded (as in Framework [Ashton-Tate]) to provide the basis for an article or book. Ideas can be entered randomly and later organized into categories and subcategories in word, phrase, sentence or paragraph form. ThinkTank (Living Videotext, $195 [requires 2.0 and 256K RAM]) helps to organize ideas about "something". You can move in or out of other programs (e.g. WordStar) as well. It can be used for "to do" lists, initial planning for projects, working out business or other strategies, planning trips, etc. Thought Organizer/Thor (Fastware Inc., $ 295 [2.0 and 128K RAM]). These packages usually include an outline generator and a simple word processor.

PROFESSIONAL DATABASE AVAILABILITY & COSTS

The costs of these networks are generally minimal. DIALOG and BIBLIOGRAPHIC RETRIEVAL SERVICE (BRS) are professionally oriented databases and provide almost identical services. These include most of the files mentioned above. There is no cost involved in obtaining an account on these systems. In fact, the subscriber will often be provided with free time to learn the system. It will probably cost between $50 and $500 to get enough documentation on the system to enable you, your secretary, your customer service representative, or "librarian" to effectively search the databases. For about $200 one can attend a day-and-a-half seminar which DIALOG offer in many cities throughout the world. The seminars and documentation are well done. There is no monthly minimum charge; it varies according to the amount of time the system is used. The costs of the databases range from about $25 per hour plus printout charges (if you request DIALOG to print the files out for you and mail them to you) of .10 per file for some of the government supported files like ERIC to over $100 per hour plus print-out costs. In addition, you may expect data communications (telephone) charges of $6 (Dialnet) or $8 (Telenet, Tymnet, Uninet) per hour.

For the personal computer user who would like to use these databases, Dialog has a "Knowledge Index" service. This offers a selected group of the files (ERIC, MEDLINE, GPO PUBLICATIONS, STANDARD & POORS NEWS, PSYCHINFO, MAGAZINE INDEX, and others) at a $24/hour rate (which includes communications charges) with a $35 initial connect charge (two free hours are credited). Search is done with English words as "begin", "find", "display", "order", and "logoff". You search for keywords which may be linked together with "and", "or", or "not"; example--FIND LEARNING AND CLASSROOM AND (COLOR OR LIGHT) NOT CONTRAST. This service is available after 6 in the evenings, all day Saturday and from 3 PM on Sunday. Billing is done through major credit cards. BRS also makes 20 of its 50 databases available to the personal computer user through "BRS After Dark." For this service there is a $50 initiation fee and a $12 minimum monthly charge plus any connect-time charges billed to your credit card. The per hour costs for the databases range from six to 15 dollars per hour.

Database Search Strategies

Professionally oriented databases like DIALOG use a keyword oriented data structure involving Boolian arguments (and, or, not) to relate the keywords/descriptors to each other in a search. Let us assume, for example, we have three related concepts to explore: 1) effects of light intensity, 2) reaction times to panel displays, 3) on the elderly. You could combine these three concepts in a single search to obtain only references including all three of these concepts/descriptors. Use a thesaurus of descriptors, if one is available for the database to identify the terms used by the database abstractors to classify documents. Then enter the appropriate file and conduct the search. The statement to the system might appear as: "ss light and reaction(w)times and elderly". This search would yield only

reports, publications or articles with these specific words. You might wish to search synonyms as well. For example, with regard to light intensity, these keywords could also be entered: light radiation, glare, lighting, visual environment, human factors engineering, light design, contrast or light(w)intensity. Selecting some of the more relevant descriptors, one might use this search strategy: "ss (light or light(w)intensity or visual environment) and (reaction(w)time? or response(w)latency or perceptual(w)motor (w)coordination) and (elderly or older= (w)adults or senior (w)citizens)". A listing of the number of publications available for each heading would be provided and the user could then decide if the search should still be narrowed or expanded. Note that the "ss" simply tells the computer to select the information by the following categories as opposed to t(ype) or e(xpand) or logoff. In some files you may search for information published between specific time periods, search by author, or search by title only. Finally, a database user can type the individual abstracts out locally or have DIALOG print them out and mail them to you.

Many files can be searched by limiting the dates or language of the publications. To limit the search in Dialog one would enter PY=1980:PY=1985 to search for documents from 1980 through 1985. To limit the search to English language materials in PsychInfo (Psychological Abstracts), enter LIMITALL/ENG when you begin the search.

POPULAR DATABASE AVAILABILITY AND COST

COMPUSERVE and the DOW JONES NEWS/RETRIEVAL are more personally than professionally oriented. The passwords, telephone numbers, and necessary documentation for both databases are all available for a one-time charge of under $30. COMPUSERVE costs about $22 per hour for 300 Baud service (between 5 a.m. and 6 p.m. Monday thru Friday), and $5 per hour (for non-prime time use) plus, in some cases, about $2 per hour for telephone costs (Telenet or Tymnet). CompuServe has over 140,000 subscribers. This database will allow you to access the Educational Products Information Exchange (EPIE), Official Airlines Guide, stock market data (Standard and Poor's, Value Line Data Base II), Federal Reports, Federal regulations, Federal publications, an electronic mail service (more on this later), games and other consumer databases.

The DOW JONES NEWS/RETRIEVAL system costs about .15 per minute for historical and current (delayed 15 minutes) quotations, about or the Dow Jones News, about .30 per minute for the Academic American Encyclopedia (about 9 million words, updated every 6 months) to about .90 per minute plus additional charges for its financial and investment services databases. The Dow Jones News/retrieval Service has about 30,000 users. The cost for this 300 Baud service is about $60 per hour during prime-time and $12 an hour otherwise. 1200 baud service is about 50% higher than 300 baud service.

The SOURCE is a subsidiary of The Reader's Digest and offers services similar to CompuServe. The initial cost for the password

and documentation is $49.95. During the day the cost for 300 Baud service is about $20.75 per hour (7:00 AM to 6:00 PM) but is reduced to $7.75 in non-prime time. The SOURCE has a monthly minimum of $10. The 1200 Baud service is $5 more during prime time and $3 more in non-prime time. By mid 1982 the Source had about 17,000 subscribers, mostly non-business users. Included in this network is a data base listing airline schedules (lists entire domestic and foreign airline schedules for flights originating in North America) which is a value-added services costing $39.75/hour or $34.75 in non-prime time, the Mobil Restaurant Guide, stock market information, an electronic mail service, a word processing service, foreign-language lessons (in Spanish, French, Latin, Greek, Italian, German, and Esperanto), and more.

Both COMPUSERVE and SOURCE offer weather and news information. CompuServe supplies up-to-the-hour weather data, read directly from the National Oceanic and Atmospheric Administration computers. The Source offers weather and news from the United Press International services.

In general, access to information on these information systems is simple and relatively inexpensive. After obtaining a password, a telephone number, and basic documentation on how the system works, you are ready to access the data. The costs range from about ten dollars per hour to over $100 per hour depending on the information system you are using, the time of day you intend to use the system and the database you select to search.

A summary of database costs together with database addresses and telephone numbers are included at the end of this paper.

COMMUNICATIONS

There are two aspects of communications to consider in relation to accessing research or other professionally related information: 1) How to communicate with a database and 2) How to communicate with an individual using electronic mail services. The electronic mail feature of these services may also be of interest to your computer center clients. Electronic mail appears to cost between .40 and $1.00 per letter (but no paper costs, no folder costs, no filing cabinet [unless you want paper copies]). Two years ago the Chancellor at Stanford University requested that his VPs use this system to communicate with him and many other institutions have since followed this lead. The Ford Foundation is currently evaluating the system at Stanford. Pierce & Cooley (1985) discuss the use of computer networks (Source or CompuServe) by educational researchers for communications involving the linking educational research and practice, assisting in publishing, and so on.

MICROCOMPUTER SOFTWARE SEARCH ASSISTANCE

The personal computer user can be greatly aided by software programs designed to assist in a Dialog search. **In Search** (Menlo

Corporation, 408/986-1200, $399) is the best. The purpose of In-Search is to make searches simpler and thus less costly for Dialog users. It does this by helping a user to decide on a search strategy before signing onto Dialog. This "access software" helps to dial the access number, log-onto Dialog, access the desired database, order the predetermined search, allow the user to modify the procedure and order a "type" or "print-out". It is difficult to bomb a session; the program is smart enough to ask you if really want to do it. The producers suggest a 15 to 20 percent reduction in search time, thus costs, when this program is used.

DATABASE AND INFORMATION SERVICES

The following is a list of databases useful to educators and trainers:

BRS, Bibliographic Retrieval Services, Inc., 1200 Route 7, Latham, NY 12110, 518/783-1161. Access to major databases, primarily for libraries, MEDLARS, Psych Abstracts, Books in Print. About $35 an hour depending on files use plus royalty and telecommunication fees; annual subscription payment of $50.

BRS After Dark (Bibliographic Retrieval Service), 1200 Route 7, Latham, NY 12110, 800/833-4707, 800/553-5566 (NY) offers a low cost alternative after 6 PM to BRS many files. It includes about 40 databases. $75 subscription fee plus from $6 to $20 per hour at 300 or 1200 baud. $12 a month minimum. Uses Telenet and Uninet. Billed to credit card.

BRS/Colleague Educator, Bibliographic Retrieval Services, Inc., 1200 Route 7, Latham, NY 12110, 800/833-4707. Educational databases as: ERIC, School Practices Information File, Exceptional Child Education Resources, Bilingual Education Bibliographic Abstracts, Mental Measurements Yearbook, Academic American Encyclopedia. $150 subscription fee $18/hour charge plus royalties and print charges. $18 minimum monthly charge.

CompuServe Information Service, 5000 Arlington Center Blvd., Columbus, OH 43220; 614/457-8600. Costs range from $12.50 daytime or $6 per hour for off-hour use (plus communication charges if any) for Associated Press, Official Airlines Guide, World Book Encyclopedia and other data bases of interest to home users. Initial fee is $39.95 with no monthly minimum.

Delphi, General Videotex Corporation, 3 Blackstone St., Cambridge, MA 02139, 800/544-4005, includes the Official Airline Guide, computer shopping, games, sends letters via ECOM, etc. Access to Dialog and Source & CompuServe mail services. You can get a starter kit for $30 which includes an hour of free time. It costs $6.00 an hour in the evening and $16.00 during the day with no tymnet chart, no monthly minimum and no premium for 1200 baud operation.

Dialog Information Retrieval Service, 3460 Hillview Ave., Palo Alto, CA 94304, 415/858-2700. Largest system with over 40 million

records. Includes ERIC, Psych Abstracts, NASA, etc. Costs from $24 an hour for ERIC to over $100 plus $8 per hour for Tymnet charges. A ten minute search could range from $5 to $15 per ten minutes, depending on database. No minimum monthly fee.

Dow Jones News/Retrieval, Dow Jones & Co., Inc., P.O. Box 300, Princeton, NJ 08540, 800/257-5114, 609/452-1511 is a financially oriented database.

GTE Telenet Medical Information Network, 8229 Boone Blvd, Vienna, VA 22180, 703/442-1000 is designed to provide clinical information to physicians, nurses, etc. $100 initiation fee plus $27 per hour prime time and $7 non-prime time.

Knowledge Index (Dialog's after 6 P.M. service), Lockheed Corporation, 3460 Hillview Avenue, Palo Alto, CA 94304, 800/982-5838 (CA) or 800/833-4707. Includes many of Dialogs most popular data bases. Initial cost of $35 includes two hours free time and necessary documentation. $24 per hour (either 300 or 1200 baud) with no monthly minimum. Access via Tymnet, Telenet, Uninet, or Dialnet. Billed to credit card.

Lexis/Nexis, Mead Data Central, Dayton, Ohio, 800/227-0597. Lexis is an on-line legal database. Nexis offers periodical information. Includes the Encyclopedia Britannica (43 million words), on-line and abstracts of the New York Times, etc.A 1 1/2 minute search may produce over 150 "hits" and cost about $19.

OAG, Official Airline Guides, Inc., Oak Brook, Ill. $50 initial fee with an average charge of $2.25 per session.

SDC Search Service, 2500 Colorado Ave, Santa Monica, CA 90406. Databases in business, economics, chemistry, engineering, electronics, energy, government, industry, science and technology and social sciences. Rates, not available.

The Source, 1616 Anderson Road, McLean, VA 22102, 800/821-6666, 703/821-6660. Geared to home and business use. Includes UPI news, Unistox market information. $49.95 registration fee; $20.75 per hour prime time, and $7.75 non-prime time with a $10/mo. minimum charge. Fee for 1200 baud service of $3 or $5.

EQUIPMENT AND TELEPHONE NETWORK REQUIREMENTS

The equipment needed for accessing these databases include 1) either a computer terminal or a microcomputer with a software modem program, 2) either an acoustic coupler or direct-connect modem operating in (at least) originate, full duplex mode at either 300 [Bell 103 compatible] or 1200 baud [Bell 212A or Racal-Vadic compatible] and be FCC approved. In addition you must contact the database personnel to obtain an account number, password, & a list of local telephone numbers to access a packet-switching network such as Telenet, Tymnet or Uninet.

To locate the local number for TELENET call 800/336-0437 (In

Virginia 800/572-0408).

To locate the local number for TYMNET call 800/336-0149 in the East and 800/323-7389 in the West.

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